

Claims

What is claimed is:

- [c1] A method of forming a drill bit structure, the method comprising:
affixing a plurality of spacers to the drill bit structure at preselected locations on
an outer surface thereof;
applying a hardfacing material to the drill bit structure;
removing the plurality of spacers;
machining holes in the drill bit structure proximate the preselected locations; and
positioning drilling inserts in each hole.
- [c2] The method of claim 1, wherein the drill bit structure comprises at least one roller
cone.
- [c3] The method of claim 2, further comprising arranging the plurality of spacers in
substantially circumferential rows on the at least one roller cone.
- [c4] The method of claim 1, wherein the drill bit structure comprises at least one
shoulder of a bit body.
- [c5] The method of claim 4, further comprising arranging the plurality of spacers in
rows on the at least one shoulder.
- [c6] The method of claim 1, wherein the spacers comprise graphite.
- [c7] The method of claim 1, wherein the spacers comprise oxide ceramic.
- [c8] The method of claim 1, wherein the spacers comprise soft metal.
- [c9] The method of claim 1, wherein the spacers comprise heat resistant plastic.

- [c10] The method of claim 1, wherein the affixing comprises adhesively bonding the plurality spacers to the drill bit structure.
- [c11] The method of claim 1, wherein the applying comprises depositing the hardfacing material using an arc process.
- [c12] The method of claim 1, wherein the applying comprises depositing the hardfacing material using a high velocity oxygen fuel process.
- [c13] The method of claim 1, wherein the positioning drilling inserts comprises brazing drilling inserts in each hole.
- [c14] A method of forming a drill bit structure, the method comprising:
 - machining a plurality of holes in preselected locations in the drill bit structure;
 - positioning a spacer insert in each of the plurality of holes;
 - applying a hardfacing material to the drill bit structure using an arc hardfacing process;
 - removing the plurality of spacer inserts from the plurality of holes; and
 - positioning drilling inserts in each of the plurality of holes.
- [c15] The method of claim 14, wherein the drill bit structure comprises at least one roller cone.
- [c16] The method of claim 15, wherein the plurality of holes are machined in substantially circumferential rows on the at least one roller cone.
- [c17] The method of claim 14, wherein the drill bit structure comprises at least one shoulder of a bit body.
- [c18] The method of claim 17, further comprising arranging the plurality of spacers in rows on the at least one shoulder.

- [c19] The method of claim 14, wherein the spacer inserts comprise graphite.
- [c20] The method of claim 14, wherein the spacer inserts comprise oxide ceramic.
- [c21] The method of claim 14, wherein the spacer inserts comprise soft metal.
- [c22] The method of claim 14, wherein the spacer inserts comprise heat resistant plastic.
- [c23] The method of claim 14, wherein the affixing comprises adhesively bonding the plurality spacer inserts to the drill bit structure.
- [c24] The method of claim 14, wherein the positioning drilling inserts comprises brazing drilling inserts in each hole.
- [c25] A method of forming a drill bit structure, the method comprising:
machining a plurality of holes in preselected locations in the drill bit structure;
positioning a spacer insert in each of the plurality of holes;
applying a hardfacing material to the drill bit structure using an arc hardfacing process;
removing the plurality of spacer inserts from the plurality of holes;
enlarging the plurality of machined holes to a selected diameter so as to enable disposition of drilling inserts therein; and
positioning drilling inserts in each of the plurality of enlarged holes.
- [c26] A method of forming a drill bit structure, the method comprising:
machining a plurality of holes in preselected locations in the drill bit structure;
positioning a spacer insert in each of the plurality of holes;
applying a hardfacing material to the drill bit structure using a high velocity oxygen fuel hardfacing process;
removing the plurality of spacer inserts from the plurality of holes;

enlarging the plurality of machined holes to a selected diameter so as to enable disposition of drilling inserts therein; and positioning drilling inserts in each of the plurality of enlarged holes.

- [c27] A method of forming a drill bit structure, the method comprising:
machining a plurality of holes in preselected locations in the drill bit structure;
positioning a spacer insert in each of the plurality of holes;
applying a hardfacing material to the drill bit structure using a high velocity oxygen fuel hardfacing process;
removing the plurality of spacer inserts from the plurality of holes; and
positioning drilling inserts in each of the plurality of holes.
- [c28] The method of claim 27, wherein the drill bit structure comprises at least one roller cone.
- [c29] The method of claim 28, wherein the plurality of holes are machined in substantially circumferential rows on the at least one roller cone.
- [c30] The method of claim 27, wherein the drill bit structure comprises at least one shoulder of a bit body.
- [c31] The method of claim 30, further comprising arranging the plurality of spacers in rows on the at least one shoulder.
- [c32] The method of claim 27, wherein the spacer inserts comprise graphite.
- [c33] The method of claim 27, wherein the spacer inserts comprise oxide ceramic.
- [c34] The method of claim 27, wherein the spacer inserts comprise soft metal.
- [c35] The method of claim 27, wherein the spacer inserts comprise heat resistant plastic.

- [c36] The method of claim 27, wherein the affixing comprises adhesively bonding the plurality spacer inserts to the drill bit structure.
- [c37] The method of claim 27, wherein the positioning drilling inserts comprises brazing drilling inserts in each hole.
- [c38] A method of forming a drill bit structure, the method comprising:
applying a hardfacing material to selected surfaces of the drill bit structure, the hardfacing material comprising:
a carbide infiltrated material comprising a plurality of perforations at preselected locations therein; and
a powder infiltrated material comprising a plurality of perforations therein, the perforations in the powder infiltrated material adapted to correspond to the perforations in the carbide infiltrated material;
machining a plurality of holes in the drill bit structure proximate the plurality of corresponding perforations; and
positioning drilling inserts in each hole.
- [c39] The method of claim 38, wherein the drill bit structure comprises at least one roller cone.
- [c40] The method of claim 39, wherein the plurality of corresponding perforations are arranged in rows.
- [c41] The method of claim 38, wherein the drill bit structure comprises a shoulder of a bit body.
- [c42] The method of claim 41, wherein the plurality of corresponding perforations are arranged in rows.

- [c43] The method of claim 38, wherein the carbide infiltrated material comprises at least one of polytetrafluoroethylene and tungsten carbide.
- [c44] The method of claim 38, wherein the powder infiltrated material comprises at least one of nickel, cobalt, chromium, boron, silicon, tungsten carbide, and polytetrafluoroethylene.
- [c45] The method of claim 38, wherein the carbide infiltrated material and the powder infiltrated material are bonded together prior to application of the hardfacing.
- [c46] The method of claim 38, wherein at least one of the carbide infiltrated material and the powder infiltrated material comprise selected areas formed from a composition having a substantially low temperature of vaporization, the selected areas corresponding to desired positions of drilling inserts to be positioned in the drill bit structure after hardfacing thereof.